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ABSTRACT

Previous research has not statistically analyzed the teacher and classroom structural characteristics related to the quality of Head Start. This study developed, tested, and validated a model to identify the characteristics and beliefs of Head Start teachers and teacher aides and the classroom structural dimensions associated with Head Start classroom quality. One hundred ninety classrooms across three Head Start programs were observed and surveyed once each year for two years. The quality of classroom teaching practices and procedures was assessed by means of the Assessment Profile for Early Childhood Programs: Research Version, review of classroom documents, and 15-minute interviews with teachers. The teachers and teacher aides also completed the Teacher Beliefs Scale, the Instructional Activities Scale and the Family Involvement Survey. Findings indicated that formal educational level had direct effects only on teacher beliefs and attitudes toward families, and an indirect effect on classroom quality through inappropriate beliefs and inappropriate instructional activities. Findings suggest future research needs. (Includes three tables and three figures to support the study findings. Contains 17 references.) (JS)

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STRUCTURAL MODEL OF HEAD START CLASSROOM QUALITY

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The purpose of this research study was to develop, test and validate a model that attempts to identify the characteristics and beliefs of Head Start teachers' and teacher aides' and the classroom structural dimensions that are associated with Head Start classroom quality. In preparation for building this structural model, five components of classroom quality as defined by the *Assessment Profile for Early Childhood Programs: Research Version* (Abbott-Shim & Sibley, 1992) were analyzed to determine whether they hold together as a latent construct.

The quality of child care classrooms has been studied extensively over the last 20 years. Factors that have related to the quality of child care include: the stringency of state child care regulation (Helburn, et al., 1995; Phillips, Howes & Whitebook, 1992; Phillips, et al., in press; Whitebook, et al., 1989); the profit, non-profit and church-sponsored status of child care programs (Helburn, 1995; Phillips, Howes & Whitebook, 1992; Phillips, et al., in press; Whitebook, et al., 1989); teaching staff characteristics such as formal education, specialized training and wages (Hayes, et al., 1990; Helburn, 1995; Phillips, et al., in press; Ruopp, et al., 1979; Whitebook, et al., 1989); aspects of classroom structure such as staff to child ratios, group size, and amount and quality of space (Doherty, 1991; Hayes, et al., 1990; Helburn, 1995; Ruopp, et al., 1979; Whitebook, et al., 1989); and aspects of center structure such as size of enrollment, and administrator's characteristics and effectiveness (Doherty, 1991; Helburn, 1995). In identifying important variables for explaining child care quality, most of these studies have used correlational analyses with hierarchical regressions or discriminant analyses, while only one study previously used structural equation modeling.

Granger (1988) and Chafel (1992) have identified some of these same factors as being related to the quality of Head Start. However, researchers have not statistically analyzed the teacher and classroom structural characteristics related to the quality of Head Start. In this study, structural equation modeling was used to determine the characteristics that are predictive of Head Start classroom quality.

Based on the child care research, a structural model of Head Start quality was proposed (see Figure 1). In the figure, the circles represent latent variables and the arrows indicate the direction of the predicted relations among the latent variables. It was proposed that the level of formal education would have a direct effect on teacher beliefs about developmentally appropriate practices, teacher self-report of frequency of instructional activities, classroom quality, and attitudes toward Head Start families. It was felt that classroom structure, teacher beliefs and instructional activities would all have direct effects on classroom quality. In addition, it was proposed that teacher education level would indirectly effect classroom quality through teacher beliefs and instructional activities.

Method

Subjects

The Georgia State University Research Center on Head Start Quality is working in partnership with three Head Start programs in the southeast to address the influences on quality, and the impact of quality on children and families. The total sample size for both Years 1 and 2 was 190 classrooms across the three Head Start programs. During Year 1 there were 175 classrooms with complete data sets where classroom observations were completed, and teachers' and aides' surveys were returned; in Year 2 there were 174 classrooms with complete data sets. The sample of participants were very similar across the two years. Therefore, the formal education, specialized training, and years of Head Start teaching experience for participants is described only for the Year 2 sample.

In describing the formal education of this Head Start sample, 13% of the teachers and slightly over 35% of the teacher aides had only achieved a high school or GED diploma. A majority of the teachers (66%) and teacher aides (57%) had attended either technical school or some college. Only 14% of the teachers had received a college degree and 5% of the teacher aides had received a college degree. Even fewer (6%) of the teachers and 2% of the teacher aides had attended graduate school or received a degree. Many of the teachers (73%) and teacher aides (32%) had earned the Child Development Associate (CDA) Credential. Another 11% of the teachers and 31% of the teacher aides were enrolled in CDA Training. The remaining teachers (17%) and teacher aides (37%) had either not yet enrolled in CDA Training or had achieved a higher level of formal education.

Measures

The *Assessment Profile for Early Childhood Programs: Research Version* was used to observe the quality of classroom teaching practices. The instrument is an observation checklist with dichotomous items and includes five scales. The Learning Environment subscale measures the provision and accessibility of classroom materials and space that support a variety of learning experiences and child independence. The Scheduling scale address both the balance and variety of activities reflected on the daily schedule. The Curriculum scale encompasses both child directed and

teacher directed learning strategies. The Interacting scale assesses teachers' initiation of positive interactions with children, teachers' responsiveness to children, and teachers positive management of children's behavior. The Individualizing scale looks for evidence of staff addressing children's individualized learning experiences through assessment, planning, referrals, and communication with parents. Validity was established through both content validity and criterion related validity. Content validity was documented through a review of the instrument by a wide range of early childhood professionals and a cross reference of the items with the Accreditation Criteria of the National Association for the Education of Young Children (NAEYC, 1984). Criterion related validity was established by examining the relationship of the *Assessment Profile* to the *Early Childhood Environment Rating Scale* (Harms & Clifford, 1980). In two validity studies Wilkes (1989) found a significant correlation ($r = .64$, $p < .001$), and Abbott-Shim (1991) found a significant correlation ($r = .74$, $p = .000$). The reliability of the *Assessment Profile* is reported for the five scales, Learning Environment, Scheduling, Curriculum, Interacting, and Individualizing. The Kuder-Richardson 20 and Spearman-Brown corrected split-half reliability coefficients range from .79 to .98 and .81 to .98 respectively. The Item Response Theory based reliability coefficients for the five scales range from .83 to .91.

The Teacher Beliefs Scale (Burts, 1991) is a survey asking teachers to rate the degree to which they believe statements related to curriculum goals, teaching strategies, guidance of socio-emotional development, language development and literacy, cognitive development, physical development, aesthetic development, motivation, and assessment are important. A companion survey, the Instructional Activities Scale (Burts, 1991) describes classroom activities, and teachers are asked to indicate the frequency of implementation for specific activities in his/her classroom. A correlational analysis using 204 teacher responses indicated that developmentally appropriate beliefs were moderately correlated with reported developmentally appropriate activities ($r = .53$, $p = .01$) (Charlesworth, et al., 1993). Subscale reliability was assessed by Cronbach's alpha with internal consistency ranging from low to moderate levels (Charlesworth, et al., 1993). These instruments yield appropriate and inappropriate scale scores for both beliefs and instructional activities. Only the inappropriate scales were used in this study as they tend to be less influenced by socially desirable responses and yielded more variability than did the appropriate scales.

The Family Involvement Survey (Burton, 1992a) is an instrument which asks teachers to report their beliefs about family-centered early childhood programming. This instrument was derived from teacher surveys and normed on 154 early childhood teachers (Burton, 1992b). Two subscales from this instrument, teachers' beliefs about families and teachers' perceptions about their ability to work with families, were used in this study.

Procedures

The quality of classroom teaching practices and procedures was collected using the *Assessment Profile for Early Childhood Programs: Research Version* (Abbott-Shim & Sibley, 1992) by: observing on 15 minute rotation cycles for a total of one hour, reviewing specific classroom documents, and interviewing the teacher for approximately 15 minutes. Descriptive structural characteristics about each classroom including class size (number of children) and number of adults present were also recorded at the time of the classroom observation. The teachers and teacher aides completed the following self-report, survey instruments: Teacher Beliefs Scale and Instructional Activities Scale (Burts, 1991), and Family Involvement Survey (Burton, 1992).

Data were collected in the winter of the 1995-96 school year (Year 1) and in the fall of the 1996-97 school year (Year 2). During each data collection period the survey instruments were distributed to the teachers and teacher aides in the three Head Start programs. Data collectors were trained to collect the classroom observations using the *Assessment Profile: Research Version*. For Year 1 reliability was computed for 14 observers with a percent of agreement range of 83 to 97, and Year 2 reliability for 16 observers with a range of 85% to 98%. Observations were collected in 190 classrooms during the two data collection periods.

Data analyses were conducted using structural equation modeling with the Lisrell VII computer program (Joreskog & Sorbom, 1989). A two stage approach was used to create the structural equations models. First, the measurement models for each latent construct were created independently. This was done in an effort to determine if the observed variables indeed fit together as single latent constructs. For each of the measurement models, the goodness of fit statistics were .90 or higher. The structural models were then formed by estimating the strength of the path coefficients between the latent variables according to the proposed model.

Results

In preparation for building the structural model, a second-order factor analysis was performed to determine whether the five scales of the *Assessment Profile: Research Version* hold together as a latent construct. Figure 2 provides the results of this analysis for Years 1 and 2 which also functions as the measurement model for classroom quality. In this figure the squares represent observed variables and the circle represents the latent variable for each year. The standardized beta weights are shown as the path coefficients in the figure. The path coefficients are reasonably similar between Year 1 and 2 and the rank orders of contribution of each observed variable to the latent variable are fairly consistent. The goodness of fit indices for the two years are as follows: root mean square residual .034 (Yr. 1) and .038 (Yr. 2); goodness of fit .99 (Yr. 1) and .99 (Yr. 2); adjusted goodness of fit .95 (Yr. 1) and .96 (Yr. 2); and normed fit index .96 (Yr. 1) and .93 (Yr. 2).

Table 1 presents the means, standard deviations, and ranges of the variables that appeared in the structural model in Years 1 and 2. As can be seen, the data for Years 1 and 2 are very similar.
The correlation matrices of all variables that appeared in the final structural model are presented in Table 2 for Year 1 and Table 3 for Year 2.

The model was tested with classroom level data from Year 1 of the project and validated with data from Year 2. Six latent variables were formed and included: Education Level (Teachers' and Teacher Aides' educational level including CDA Credential), Teacher Beliefs (Teachers' and Teacher Aides' inappropriate beliefs total scale), Instructional Activities (Teachers' and Teacher Aides' inappropriate instructional activities total scale), Structure (class size and child/adult ratio), Attitudes toward Head Start Families (Teachers' and Teacher aides' family attitudes subscales), and Quality (learning environment, scheduling, curriculum, interacting, and individualizing scales).

Figure 3 depicts the final model. Educational Level was shown to have a direct effect on Inappropriate Beliefs (Yr 1 -.41, Yr 2 -.37) which in turn impacted Inappropriate Instructional Activities (Yr 1: .90, Yr 2: .95) which influenced the Quality of the classroom environment (Yr 1: -.40, Yr 2: -.33). Neither Educational Level nor Teacher Beliefs had direct effects on Quality, but rather had indirect effects through Instructional Activities. Structure impacted Quality directly (Yr 1: -.25, Yr 2: -.33). Both Educational Level (Yr 1: .50, Yr 2: .45) and Quality (Yr 1: .01, Yr 2: .39) impacted Attitudes Toward Head Start Families. All of the path coefficients between latent variables were replicated in very similar magnitude from Year 1 to Year 2 with the exception of the path from Quality to Attitudes Toward Head Start Families. In Year 1 this path was not significant, however in Year 2 it was significant and estimated to be .39.

Discussion

In comparing the final model (Figure 3) to the proposed model (Figure 1), the formal educational level only had direct effects on teacher beliefs and attitudes toward families, with an indirect effect on classroom quality through inappropriate beliefs and inappropriate instructional activities. In considering the validation of the model in Year 2, the teachers and teacher aides were the same in some but not all of the classrooms for both years. However, due to turnover and restructuring, the results were not based upon simply asking the same individuals the same questions at two different time periods.

The large magnitude of the path coefficient between Inappropriate Beliefs and Inappropriate Activities caused us to question whether the various observed variables that make up these latent constructs are actually better modeled as if they were influenced by a single underlying construct. Therefore, we created alternative models for each year that included only one latent construct for all of the beliefs and activities observed variables, including models that used only some of the observed variables from these two latent variables in the models discussed above. The decisions to drop some variables were based on selecting only a single variable when pairs of observed variables were highly correlated. However, for none of these models was the goodness of fit statistics ever exceeding those of the reported models discussed above. In addition, the root mean square residuals were never less than .05.

A possible explanation for the large path coefficient from Inappropriate Beliefs to Inappropriate Activities is that this particular population of teachers does not differentiate between beliefs about teaching and the implementation of activities in the classroom. Given the relatively low level of formal education that most of these teachers have achieved, it may be that they take more of a practical view of teaching that consists of a set of activities and techniques that they employ in the classroom, as opposed to having a core set of beliefs that helps them determine which activities to implement. If this is true, it may be unrealistic to think that they function on a level of reflection that differentiates theory and belief from a sense of what works in the classroom. This approach may also be, in part, attributable to the training they have received which usually does not emphasize theories and beliefs. If that is the case, then these teachers

may have a sense of what they feel they are supposed to do in the classroom without necessarily knowing rationale and theoretical basis for their teaching strategies. This finding may indicate that this population of teachers focuses more on what they can or should do in the classroom and less on why they do what they do.

In considering the coefficient of .01 between the Quality variable and the Attitudes toward Head Start Families variable in Year 1, it was found that some of the teachers and teacher aides expressed concern that they did not have enough time to complete the survey instruments during this first administration. Since the Family Involvement Survey was the last instrument in each packet, it is possible that teachers and aides were too rushed and did not have sufficient time to accurately complete this survey. This might explain the low coefficient for Year 1. During Year 2, all teachers and teacher aides were given ample time to complete the survey instruments.

This study provides strong support to previous child care research demonstrating that the teachers' and teacher aides' education and the classroom structure (child to adult ratio and class size) are related to classroom quality for Head Start. However, the assessment of teachers' beliefs and instructional activities adds new dimensions to the causal model of quality. Both the teachers' educational level and the teachers' inappropriate beliefs did not have direct effects, but had indirect effects through the teachers' report of frequency for implementing inappropriate activities.

Future research needs to further address the relationship between teachers' formal education, specialized training, teaching experience, teaching beliefs, and instructional activities. Since teachers' and teacher aides' salaries were fairly uniform across these Head Start programs, both salaries and benefits were not included in this study. However, the influence of these characteristics should be examined within the broader Head Start context.

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Table 1
Means, Standard Deviations, and Ranges of Variables in the Structural Model in Years 1 and 2

	M		*SD*		Range	
	Year 1	Year 2	Year 1	Year 2	Year 1	Year 2
Quality						
LRN	53.13	54.40	7.85	9.66	40.19	57.34
SCH	47.74	47.53	6.04	7.32	30.88	33.12
CUR	39.62	41.18	5.94	6.14	27.66	34.15
INT	50.12	51.54	5.82	6.00	22.33	23.53
IND	51.08	51.61	5.82	6.06	27.81	38.41
Teacher Beliefs (5 point scale)						
INBF	2.10	1.82	.78	.71	3.60	2.90
INBF2	2.34	2.21	.86	.87	3.45	3.19
Instructional Activities (5 point scale)						
INAC	1.82	1.78	.53	.62	3.58	4.00
INAC2	1.92	1.94	.58	.69	3.03	3.00
Attitude Toward Families (4 point scale)						
			.46	.28	2.38	1.63
FMB	2.12	2.16	.43	.37	2.25	2.16
FMB2	2.15	2.14	.32	.22	1.57	1.29
FMC	1.43	1.57	.34	.29	1.57	1.57
FMC2	1.48	1.62				
Education (10 point scale)						
EDUC	6.26	6.49	2.18	1.94	9.0	8.0
EDUC2	5.14	5.08	2.36	2.33	9.0	8.0
Structure						
RATIO	7.47	7.38	1.81	1.72	12.5	11.0
# CH	15.92	16.49	2.22	2.13	13.0	11.0
# AD	2.22	2.36	.48	.59	3.0	4.00

Table 2
Correlations Among All Variables in the Final Model (Year 1)

	LRN	SCH	CUR	INT	IND	INBF	INBF2	INAC	INAC2	FMB	FMB2	FMC	FMC2	EDUC	EDUC2	YRHS	YRHS2	CRED	CRED2	RATIO	#CH	#AD
LRN*	000																					
SCH	396	1.000																				
CUR	299	206	1.000																			
INT	259	118	417	1.000																		
IND	155	247	306	016	1.000																	
INBF	-.131	-.150	-.101	-.104	-.122	1.000																
INBF2	-.281	-.102	-.080	-.104	-.092	472	1.000															
INAC	-.088	-.077	-.123	-.154	-.116	386	272	1.000														
INAC2	-.254	-.132	-.093	-.214	-.142	292	555	395	1.000													
FMB	035	-.047	-.125	-.124	-.036	031	-.041	070	045	1.000												
FMB2	-.071	-.041	-.041	109	-.003	-.112	-.119	072	-.012	409	1.000											
FMC	125	043	008	-.016	043	-.086	-.155	204	008	249	209	1.000										
FMC2	100	-.023	063	112	068	-.067	-.139	071	-.071	071	318	187	1.000									
EDUC	116	166	-.067	079	023	-.030	-.043	-.052	-.096	-.169	-.070	-.027	061	1.000								
EDUC2	-.008	-.058	-.060	-.037	-.032	019	076	-.094	033	-.196	-.216	-.075	-.031	114	1.000							
YRHS	-.239	-.141	-.125	-.108	-.009	221	250	002	167	005	-.078	-.114	-.006	-.196	032	1.000						
YRHS2	043	047	-.064	025	-.106	003	-.042	072	-.131	-.034	008	-.074	-.085	085	-.028	201	1.000					
CRED	-.041	-.061	-.123	-.030	034	052	161	-.021	076	-.067	-.062	-.017	004	129	142	343	141	1.000				
CRED2	-.033	027	-.114	-.085	012	-.023	-.127	-.067	-.183	-.086	-.085	-.113	-.189	019	171	147	501	207	1.000			
RATIO	-.140	-.171	-.009	-.029	099	131	-.148	-.009	-.028	-.012	014	-.004	-.018	-.066	073	-.002	-.091	-.052	-.052	1.000		
#CH	-.154	-.058	-.037	-.085	021	-.019	-.125	098	-.057	-.050	045	031	-.054	-.195	045	-.010	-.110	-.034	-.071	524	1.000	
#AD	030	169	010	-.036	-.112	-.133	099	135	013	-.031	-.025	032	-.040	-.014	-.081	-.059	011	028	-.028	-.748	048	1.000

a Note LRN=learning environment; SCH=scheduling; CUR=curriculum; INT=interacting; INBF=inappropriate beliefs; INAC=inappropriate activities; FMB=sect.b, family involvment survey; FMC=sect.c, family involvement survey; EDUC=education level; YRHS=years of Head Start experience; CRED=credential; RATIO=child/adult ratio; #CH=number of children; #AD=number of adults. Variables INBF through CRED2 are scores for the teacher and the teacher aide with those for the aide ending with the number 2.

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Table 3
Correlations Among All Variables in the Final Model (Year 2)

	LRN	SCH	CUR	INT	IND	INBF	INBF2	INAC	INAC2	FMB	FMB2	FMC	FMC2	EDUC	EDUC2	YRHS	YRHS2	CRED	CRED2	RATIO	#CH	#AD
LRN	1.000																					
SCH	.048	1.000																				
CUR	.230	.199	1.000																			
INT	.247	.115	.319	1.000																		
IND	.189	.288	.332	.294	1.000																	
INBF	-.118	-.082	-.117	-.216	-.159	1.000																
INBF2	-.006	-.038	.028	-.035	-.009	.276	1.000															
INAC	-.079	-.023	-.026	-.119	-.202	.368	.040	1.000														
INAC2	-.205	-.103	-.178	-.220	-.220	.222	.539	.177	1.000													
FMB	-.045	-.108	.002	-.018	-.080	-.053	-.088	.056	-.068	1.000												
FMB2	-.177	-.003	.025	-.083	.003	-.006	-.157	-.054	-.101	.046	1.000											
FMC	.065	.036	-.008	.006	.025	-.071	-.016	-.007	.013	.180	.078	1.000										
FMC2	-.097	-.031	.113	-.043	.039	-.049	-.163	-.125	-.153	.095	.360	-.069	1.000									
EDUC	.161	.014	.192	.110	.097	-.148	-.072	-.059	-.035	.124	.084	.181	.140	1.000								
EDUC2	.143	-.043	-.070	.122	.077	.039	.064	.050	.040	-.056	-.042	.051	-.024	-.008	1.000							
YRHS	-.036	-.091	-.034	-.014	-.001	.156	.188	.048	.190	-.027	.004	-.201	-.051	-.128	-.054	1.000						
YRHS2	-.001	-.083	.002	-.033	.041	.133	.144	.111	.108	-.062	.033	.038	-.149	.027	-.133	.007	1.000					
CRED	.034	-.043	.069	.143	-.011	-.128	-.064	-.052	-.085	-.054	.114	-.034	.035	.330	.069	.278	.116	1.000				
CRED2	.072	-.082	.008	.035	.135	.117	.143	.162	.027	.018	-.124	.031	-.177	.028	.120	.063	.527	.049	1.000			
RATIO	-.076	-.137	-.011	-.028	-.172	.141	.018	.116	-.018	-.121	-.017	-.099	.078	-.049	-.004	.121	-.078	.107	-.123	1.000		
#CH	.094	-.217	-.057	-.153	-.222	.205	-.035	.113	.065	.060	.058	.006	.074	.025	.078	.066	-.080	-.003	-.082	.443	1.000	
#AD	.093	.001	.029	-.065	.077	-.028	-.057	-.078	.059	.173	.054	.102	-.027	.077	.015	-.058	.027	-.106	.076	-.794	.120	1.000

a. Note: LRN=learning environment; SCH=scheduling; CUR=curriculum;INT=interacting; IND=individualizing; INBF=inappropriate beliefs; INAC=inappropriate activities; FMB=sect.b, family involvement survey; FMC=sect.c, family involvement survey; EDUC=education level; YRHS=years of Head Start experience; CRED=credential; RATIO=child/adult rate; #CH=number of children; #AD=number of adults. Variables INBF through CRED2 are scores for the teacher and the teacher aide with those for the aide ending with the number 2.

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FIGURE 1
PROPOSED STRUCTURAL MODEL OF CLASSROOM QUALITY

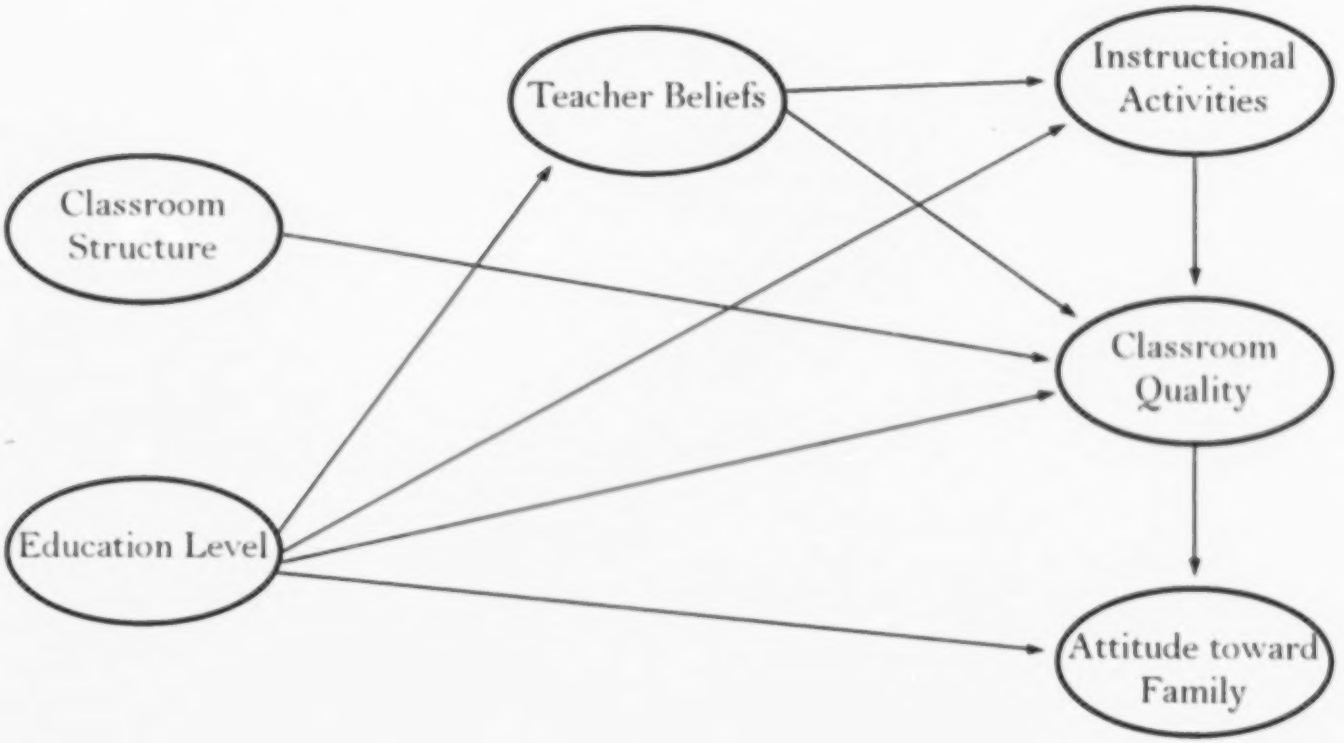

FIGURE 2

SECOND ORDER FACTOR ANALYSIS OF THE *ASSESSMENT PROFILE FOR EARLY CHILDHOOD PROGRAMS: RESEARCH VERSION*

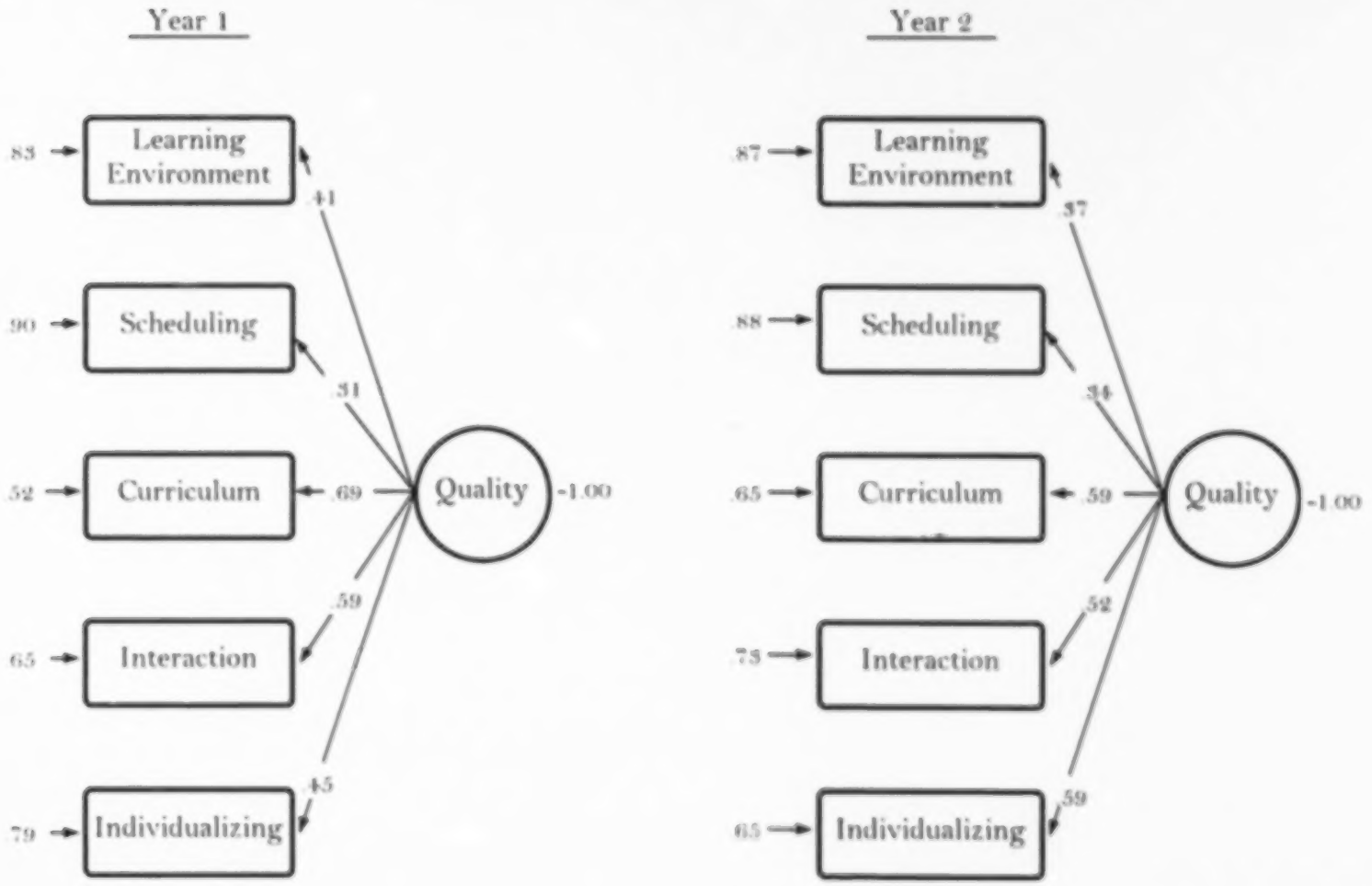

FIGURE 3
FINAL STRUCTURAL MODEL OF CLASSROOM QUALITY

Coefficients = Yr. 1, Yr.